

surgical convalescence but as counsel and guide to them in carrying out their program of altered intestinal hygiene.

✱

WILLIAM H. DANIEL, M. D. (1930 Wilshire Boulevard, Los Angeles).—The history of chronic ulcerative colitis is one of prolonged medical treatment, with remissions and exacerbations. In cases in which medical treatment has no effect on the course of the disease, it is necessary to divert the fecal stream in order to allow the lesions in the colon a chance to heal. There is no doubt that in many of these cases the colon remains as a reservoir of infection which is inimical to the welfare of the patient, and this source of infection should be removed. There has been a tendency in the past few years to treat ulcerative lesions of the colon by ileostomy and colectomy. The operation is not without hazard because of this infection, and because the patient is in poor condition when the operation is attempted. Good results have been reported by several authors. We are well aware of the fact that polyps form upon irritative lesions of the bowel and that these polyps are prone to undergo malignant degeneration. In the removal of the colon which is infected and predisposed to polyp formation, the possibility of cancer is eliminated. Doctors Delprat and Weeks have presented a very interesting discussion of the conditions which may result in colectomy. The case report that is here presented was complicated by regional ileitis, which made the operative procedure much more difficult. They are to be complimented upon the successful outcome of the four cases presented. This work should be a stimulus to further endeavor along the same lines.

MILIARY LESIONS OF THE LUNG, ROENTGENOGRAPHICALLY CONSIDERED*

By RAY A. CARTER, M.D.
Los Angeles

DISCUSSION by Henry Snure, M.D., Los Angeles;
Milton J. Geyman, M.D., Santa Barbara; M. L. Pindell,
M.D., Los Angeles.

MIILIARY appearances on the roentgenogram of the lung are of grave importance. They most often represent either a rapidly fatal form of tuberculosis or a mild silicosis. They may be produced also by many less common diseases, benign or severe, which are often not even thought of, so strong is the tendency to diagnose tuberculosis. Such lesions are expected to appear as minute rounded spots of density on the film. We may consider the diseases which produce such lesions, the factors which influence their visibility and appearance on the roentgenogram, and the differential diagnosis so far as it is available.

Miliary pulmonary lesions may be defined as minute rounded densities up to three millimeters diameter disseminated more or less uniformly in both lungs. Strictly local involvements may be excluded for the present purpose. The common criteria of roentgen diagnosis are the size, density, discreteness, and distribution of the rounded miliary shadows themselves. Increasingly, attention is paid to a fine reticulum, or network of shadows, which may accompany the "miliary" spots. Non-miliary telltale appearances on the film and associated clinical findings are also used.

Autopsies show us that miliary lesions may fail to register on the film and that their manifestations

vary from case to case, as well as from disease to disease. The reasons for this are to be sought in the pathology present, the degree of aëration of the lung, the quality of the film, and the physical laws involved in depicting densities by means of the roentgen ray.

SUMMATION OF SHADOWS

The effect of summation of shadows on the visibility and appearance of structures of miliary size has been much discussed in recent literature. One may cite the work of H. Franke,¹ Heckmann and Barth,² and Heckmann,³ and summarize such effects as follows:

1. Minute foci, like miliary tubercles, are of too low physical density to record singly on the film, and do so only by summation of the shadows of several or many such overlying lesions. If the lesions are too few, there is inadequate summation and no image; if too profuse, the shadows may merge into an almost structureless haze.

2. Such reinforcement cannot be produced by a uniform overlying density, such as the soft tissues of the thoracic wall, but requires structures themselves irregular in density. Deeper layers of miliary foci, and even the normal bronchovascular structures will serve. Heckmann and Barth² accomplished this experimentally, using the reticular structure of a piece of zweiback.

3. Miliary lesions, so reinforced, do not appear solely as rounded densities, but in part as a fine-meshed net, or reticulum. Further, the faint normal reticulum of the lung is, itself, a summation of the overlying fine interstitial pulmonary structures.

4. Uniform filtering by overlying soft tissues may aid summation indirectly by decreasing the general film blackness from one too intense for differentiation of slight variations in density to one so reduced that the eye can detect them. Conversely, it may carry the density too low for visualization. Thus the breast shadow may either bring out or obscure a miliary appearance locally.

5. The nodules seen by summation are usually those of a relatively thin layer nearest the film. The others add little to the apparent number, and exhaust themselves in reinforcing those seen. Thus, the real number of foci is far greater than the apparent.

6. The above summations are real images, since they represent actual structures in line with the images on the film. There are also unreal images dependent upon the fact that the focal spot of the x-ray tube is broader than the miliary lesion itself. This causes the direct shadow cast by the lesion to be a slender cone, apex toward the film, called by Bronkhorst the "Kernschatten."² If the lesion is so far from the film that this direct shadow does not reach it, a less dense spreading shadow, the "Pseudokernschatten," extends onward to reach the film. This is surrounded by a still vaguer halo, the "Halbschatten." Sufficient of these indefinite shadows may intersect by chance to produce miliary shadows, which represent no real underlying foci, and are termed by Heckmann³ unreal images.

7. The direct shadows, for physical reasons not detailed here, are smaller in diameter than their

* Read before the Radiology Section of the California Medical Association at the sixty-seventh annual session, Pasadena, May 9-12, 1938.

geometric projection would indicate, and the harder the ray the narrower the shadow cast. This explains how the same bronchovascular detail appears coarse on low kilovoltage films, slender and wiry on high kilovoltage ones.

These are basic reasons why miliary lesions produce such variable proportions of fine nodulations and reticula on the film. Under the terms "mottling," "granular density," "flaking," etc., we translate such appearances into a diagnosis of miliary involvement. Also, we see the lesions are not represented accurately as to size, number, or location. Stereoscopy helps little because the shifted focal spot of the tube changes the summations. Much that is far off the film is lost, even small cavities and confluent lesions. Snure and Maner⁴ have described a comparable loss of detail in bone. The smaller apices with less summation appear poorly seeded though the insemination is uniform. Diagnosis based upon the size, density, discreteness or number of miliary spots, or on the presence, absence or character of a reticulum, must be made with caution, particularly as to associated interstitial fibrosis.

OTHER FACTORS

Air contrast provided by surrounding alveolar air is a factor, as discussed by Rappaport.⁵ Detail is lost by either overaëration or underaëration. The normal adult lung in full inspiration appears to provide the optimum condition for fine delineation. The low air contrast of the normal infant lung and the high aëration of emphysema both diminish it.

Technical considerations are important. The miliary appearance may be obscured by movement, over or underexposure, excessive or insufficient contrast, an overlarge focal spot in the x-ray tube, inadequate tube-film distance, coarse-grained intensifying screens, poor screen contact, or improper darkroom handling. The portable film is particularly inadequate.

The histologic composition of the lesion was considered by Heckmann and Barth² to have no effect on the appearance of miliary lesions. Steiner⁶ found that his cases of miliary tuberculosis having epithelioid tubercles failed to record on the film, while calcification or caseation added sharply to their visibility. Dunham and Skavlem⁷ rated serous exudate, cellular exudate, fibrosis, caseation, and calcification, as progressive orders of density. Neoplastic nodes in the lung are of soft density, though sharply circumscribed.

SPECIAL DISEASES

Miliary tuberculosis was surveyed for the above points in fifty-nine autopsied cases. Twenty-nine cases were juveniles, the great majority in the first five years; thirty were adults, the majority under forty; while a few were of advanced age.

No nodulation was seen on the films of eleven juveniles and six adults. No abnormal reticulum was evident in nine juveniles and four adults. These findings so coincided that, roughly, 30 per cent of juveniles and 17 per cent adults had no direct demonstration of their miliary lesions. A few of these had seedings too sparse for summation. A few portable, or otherwise substandard films,

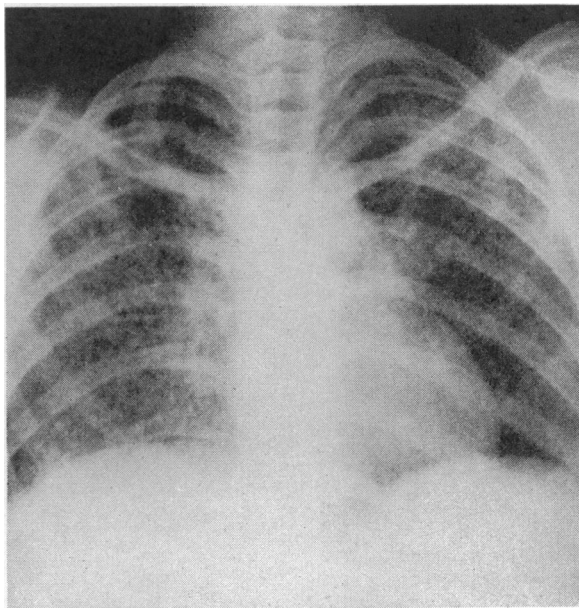


Fig. 1.—Coarse miliary tuberculosis in a child of thirteen. Nodular predominance. Obscure confluent lesions and cavities at the apices. Normal air-contrast and expansion.

were not calculated to reveal minute detail. Most had heavy inseminations and reasonably adequate films. Some had a vague blurriness or ground-glass appearance, which might be considered, at most, suggestive. The negative film does not exclude the disease.

Those showing real evidence of miliary involvement had varying proportions of nodular and reticular shadows. One only appeared almost wholly reticular, one almost wholly nodular. Juveniles had, on the whole, more nodular manifestations, adults more reticular. Nodulation might predominate in one part of the lung field, reticulation in another. Films viewed at some distance appeared more nodular, at reading distance they seemed more reticular. A "reticulum" was accepted only when definitely abnormally profuse. The reticulum tended to correspond to the nodules in coarseness.

There is, necessarily, a large personal factor in analyzing the characteristics of the nodulations. Our impressions were as follows. The radiographic density was low in most juveniles, high in a few. It averaged from moderate to high in the adults. Discreteness, or sharpness of outlining, was moderate to low. The size was almost evenly divided between fine (one to two millimeters diameter) and coarse (three millimeters diameter). The average profuseness of seeding was much higher than in comparable diseases. The distribution was uniform throughout the lung fields in the great majority. There were local accentuations in a few. One only was truly localized.

It was attempted to judge the air contrast by the blackening immediately about the lesions, ignoring the general impression of low contrast due to the profuse seeding. This contrast was normal in a great majority. A few had undercontrast with pleural thickening or scant fluid exudate. A few juveniles had overcontrast with seeding sufficiently profuse to imply a significant loss of respiratory

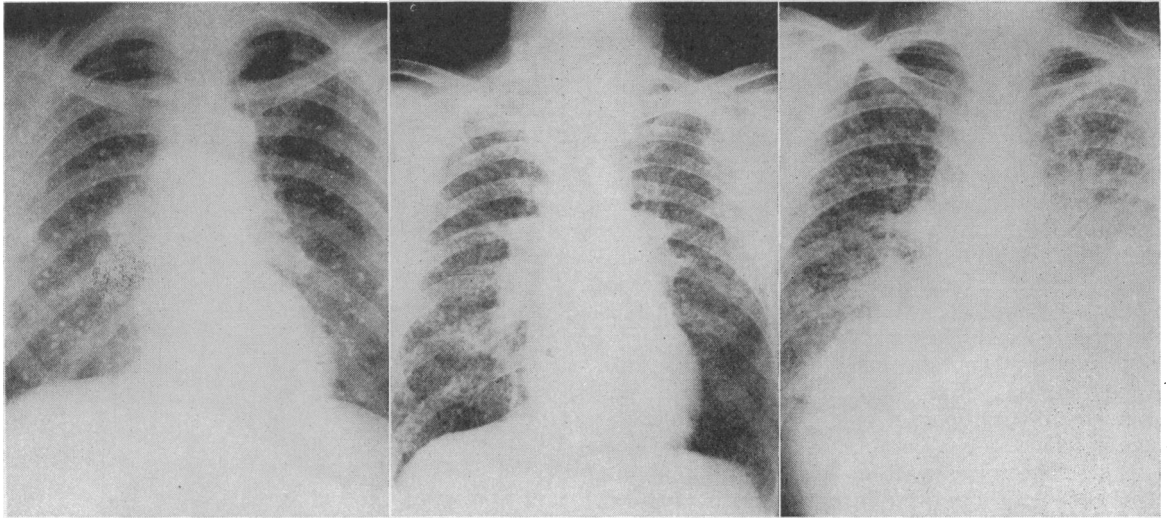


Fig. 2

Fig. 3

Fig. 4

Fig. 2.—Nodular silicosis with reticulation. Increased air contrast and overexpansion. Basal emphysema.

Fig. 3.—Sparse miliary calcifications. Calcification of hilar and peritracheal glands. No respiratory symptoms or tuberculous history.

Fig. 4.—Miliary carcinomatosis of bronchogenic origin. Right, basal fluid. Coarse reticulation predominates over the nodular appearances.

capacity. Pulmonary expansion corresponded to the air contrast.

Associated nonmiliary tuberculous lesions were evident in almost half the lungs. Hilar adenopathy, usually calcareous, was seen in 20 per cent of adults, and in over half of the juveniles, usually with enlargement. Enlargement of paratracheal glands was seen in 73 per cent of juveniles; paratracheal adenitis, usually calcareous, in 27 per cent of adults.

To correlate these findings: the average nodular manifestation was a uniform profuse seeding of low density and moderate to low discreteness, registering fairly clearly on a background of normal air contrast, by stippling so fine that a nodule three millimeters in diameter was coarse (Fig. 1). The smaller lesions were on the whole more profuse. These fine uniform inseminations on a background of normal or low air contrast appear unlike comparable diseases and quite characteristic, and were about half the series. Adding to these the paratracheal glandular enlargements of children and nonmiliary tuberculous appearances, the great majority would be considered tuberculous except by a real clinical discrepancy.

A minority of adults, having sparser, coarser seeding without other characteristic parenchymal lesions, have films most resembling other miliary diseases.

This series did not support the conception that acute generalized miliary tuberculosis is associated with fine profuse seeding, and less acute pulmonary involvement with the coarser lesions. Coarser lesions were seen in the acute generalized form. Very fine stippling might remain unenlarged for weeks or months. Particularly in children, small cavities, small acute "Ghons," or other small confluent lesions were often not visible, apparently lost in the miliary summations.

Chronic miliary tuberculosis, or *granulie froide*, occasionally occurs. It is seen, according to Saye,⁸

most frequently between the ages of eighteen and thirty. It has remained quiescent as long as eleven years. It may end in resolution or in more acute disease. Minor symptoms, the miliary appearance with associated nonmiliary lesions, and enlarged paratracheal glands, may suggest the disease.

Miliary calcifications are usually thought to be healed miliary tuberculosis. Calcium metastasis has been considered. Sayers and Meriwether⁹ reported 125 cases, mostly without clinical disease. They found *Aspergillus* in all sputa examined, but drew no final conclusion as to the origin of the involvement. The calcific seeding is so very sparse that healing would not be remarkable even though the lesions were tuberculous. The miliary calcifications are unmistakable roentgenographically, whatever their origin (Fig. 2).

Nodular silicosis may simulate miliary tuberculosis of coarse type (Fig. 3). By the time definite nodules or a sharp reticulum appears, there is usually an increased air contrast and early overexpansion of the lung unusual in tuberculosis. The bases and apices are relatively clear. The larger bronchovascular structures and hila are more thickened. The silicotic nodule is described as sharply discrete and dense. This may be partly due to heightened air contrast rather than to the intrinsic density of the nodule itself. Early silicosis may show an exceedingly fine nodulation and a reticulum more like that of fine miliary tuberculosis. Increased contrast and expansion have helped in differentiation. History is essential. In view of the known reticular summation effects, inferences of interstitial fibrosis must be made cautiously even though this is an essential part of the pathology of the disease. Silicosis also varies in manifestations from case to case. Pancoast and Pendergrass¹⁰ comment that those seeing silicosis predominantly from one industrial source may be confused in encountering cases having a different type of silica exposure.

Silicosis with tuberculosis is usually identified by the character of the more massive nonmiliary manifestations of the two diseases. The determination from the film of how far either disease is responsible for the miliary lesions themselves is a severe and often impossible roentgen problem. Nodules with a discrete center and hazy border, extension of nodules to the apex, and lesions radiographically more advanced than the clinical disease would indicate, suggest a combined lesion.¹¹ Decisions in this field require close study of history and of the progress of the disease, and wide experience.

Miliary carcinomatosis may occur as metastasis from either bronchogenic or distant carcinoma. We may exclude cases in which larger nodes are scattered among those truly miliary. These larger nodes, circumscribed but not dense, are inconsistent with tuberculosis or silicosis. Those having uniform, coarse miliary nodulation may resemble either disease, particularly the coarser type of miliary tuberculosis (Fig. 4). Associated severe illness heightens the resemblance. Some of our cases have had an accompanying coarse hazy reticulum. Others have appeared almost purely nodular. The involvement tends to be basally accentuated. Hilar or mediastinal mass, atelectasis, suggestive symptoms, or a known distant primary may suggest the disease. Otherwise these cases have little to indicate their origin. Compared with nodular silicosis, the nodules are less dense and discrete, and are without surrounding increased air contrast.¹²

Coccidioidal granuloma has frequently shown profuse miliary involvement at autopsy. Usually this is represented on the film by a diffuse unorganized smearing of detail without discrete nodules or reticulum. One learns to infer the miliary involvement from this, knowing the disease to be present or seeing associated hilar and mediastinal glandular mass in the adult. Occasionally vague miliary nodulation is evident. Scattered cutaneous ulcers and/or scattered osseous lesions increase the chance of the disease in a region where it is frequently encountered. A terminal meningitis is common.

Other mycotic disease may cause miliary disease and the miliary appearance. Blastomycosis and torulosis among others may cause acute disease. Pencillium, Aspergillus, and others may produce more chronic illness.¹³ It is more important to test the sputum for fungi than to attempt differentiation on the film. Terminal meningitis is common in acute mycoses and is not indicative of tuberculosis.

Miliary bronchopneumonia occasionally occurs. We have seen a few cases following measles in small children. The nodulation was coarse, uniformly distributed, hazy, sparser than the usual tuberculosis, and without evidence of hilar and paratracheal adenopathy. Post-measles miliary involvement should be given an opportunity to resolve before diagnosing it as tuberculosis, particularly in absence of adenopathy. We have seen a few adult miliary bronchopneumonias. Resolution within an appropriate period and the history made the diagnosis.

Miliary abscess of the lung in one of our cases produced a vague nodulation. Autopsy made the diagnosis.

Petechial pulmonary hemorrhage in infants producing a tuberculosis-like miliary appearance was reported by Anspach.¹⁴ These patients had acute fatal ulcerative enteritis. Diagnosis will depend upon recognition of a clinical cause for such hemorrhage.

Periarteritis nodosa has been cited as a cause of miliary appearance.¹⁵ This must occasionally occur, though most reported lesions appear to be of grosser type. Diagnosis depends upon prior recognition of the disease on clinical grounds.

General sarcoidosis may have miliary or larger pulmonary lesions. This or similar diseases under numerous names, such as Boeck's disease, Darier-Roussy's disease, lupus pernio, etc., may have epithelioid tubercles in almost any organ. There is considerable disagreement concerning their origin. Pinner¹⁶ considers them tuberculous. Miliary or larger lesions are seen in the perihilar and adjacent regions of the film, not reaching to the periphery, and associated with hilar masses.^{17,18} Saacke¹⁸ described an exceedingly fine reticular network in her case. These features, a benign course, and, if present, cutaneous nodules or cystic expanding lesions of bone, may permit recognition.

Incidental miliary appearances occur on the films of many normal chests, due to accidental miliary summations. They may be at the bifurcations of the fine vascular linear shadows, scattered sparsely, or in small clusters. Miliary disease should not be lightly assumed from such minor manifestations.

COMMENT

The miliary appearance is most frequently due to tuberculosis or nodular silicosis, occasionally to miliary carcinomatosis. Other occasional pathologic causes are so numerous that complete listing is almost impossible. Many are so rare that roentgen differentiation cannot be attempted. Even in the common ones, diagnosis from the film should be made with cautious regard for the limitations imposed by the similarity of different diseases, the variations in appearance in any one disease, and the vagaries of summation effects. History is essential. When inconsistency of symptoms or history arise, there are numerous possibilities requiring exhaustive use of all clinical and laboratory aids. Often the progress of the disease provides the clue.

1200 North State Street.

REFERENCES

1. Franke, H.: Wirkliches und Scheinbares im Röntgenbilde, Fortschr. a. d. Geb. d. Röntgenstrahlen, 50:53-57, 1934.
2. Heckmann, K., and Barth, L.: Die Abbildung des Lungesherdes im Röntgenbild, Fortschr. a. d. Geb. d. Röntgenstrahlen, 53:774-783, 1936.
3. Heckmann, K.: Reales und Unreales Lungenbild, Fortschr. a. d. Geb. d. Röntgenstrahlen, 53:783-789, 1936.
4. Snure, Henry, and Maner, George D.: Roentgen-ray Evidence of Metastatic Malignancy in Bone, Radiology, 28:172-177 (Feb.), 1937.
5. Rappaport, Israel: Phenomena of Shadow Attenuation and Summation in Roentgenography of the Lungs, Am. J. Roentgenol., 35:772-776, 1936.

6. Steiner, Paul E.: The Histologic Basis for the X-ray Diagnosability of Pulmonary Miliary Tuberculosis, *Am. Rev. Tuberc.*, 36:692-705 (Nov.), 1937.
7. Dunham, H. Kennon, and Skavlem, John: X-ray Observations of the Pathogenesis of Pulmonary Tuberculosis, *Tuberc.*, 5:1-16, 1924.
8. Saye, L.: Chronic Miliary Tuberculosis, *Tuberc.*, 18:153-170 (Jan.), 1937.
9. Sayers, R. R., and Meriwether, F. V.: Miliary Lung Disease Due to an Unknown Cause, *Am. J. Roentgenol.*, 27:337-351, 1932.
10. Pancoast, Henry K., and Pendergrass, Eugene P.: A Review of Pneumoconiosis, *Am. J. Roentgenol.*, 26:556-614, 1931.
11. Pancoast, Henry K., and Pendergrass, Eugene P.: Roentgenologic Aspects of Silicosis and Silico-tuberculosis, *Am. Rev. Tuberc.*, 29:43-60, 1934.
12. Ziegler: Differentialdiagnostik der Generalisierten Lungenkarzinose, *Deutsches Tuberk. Bl.*, 10:119-123, 1936.
13. Fawcitt, Richard: Roentgen Recognition of Certain Bronchomycoses Involving Occupational Risks, *Am. J. Roentgenol.*, 39:19-31 (Jan.), 1938.
14. Anspach, William E.: "Miliary" Pulmonary Hemorrhages on Necroscopy Roentgenograms of Children, *Am. J. Roentgenol.*, 30:768-773, 1933.
15. Garland, L. H.: X-ray Aspects of Pneumoconiosis, *Radiol.*, 27:21-32, 1936.
16. Pinner, Max: Noncaseating Tuberculosis, *Am. Rev. Tuberc.*, 36:706-709 (Nov.), 1937.
17. Hunter, Francis T.: Hutchinson-Boeck's Disease (General Sarcoidosis), *New England J. Med.*, 214:346-352, 1936.
18. Saacke, Margarete: Ein Beitrag zur Frage der Lungenveränderungen, beim Boeckschen Sarkoid, *Med. Welt*, 10:124-125, 1936.

DISCUSSION

HENRY SNURE, M.D. (1414 South Hope Street, Los Angeles).—Doctor Carter rightly stresses the vagaries of summation effects in his comments. Summation effects were known shortly after the discovery of the roentgen ray; but frequently they are forgotten or ignored. Particularly is this true of soft tissue densities. This is in spite of the fact that it is common knowledge that, while many small gall-stone shadows can be counted on a film, the actual number of stones found at operation is usually four or more times greater.

The soft miliary densities of tuberculosis visualized on the film constitute only a small percentage of the miliary lesions present. Some lesions will be too small to be visualized on the films under any circumstances. I recall three cousins, dying of miliary tuberculosis within a few days of each other, where I had an opportunity to study the lungs in varying degrees of inflation at autopsy, and no changes were noted on the film. These miliary lesions were about a millimeter in diameter and were easily seen macroscopically.

Today, with our fine focus rotating anode tubes, fine-grain screens and faster non-screen films, a larger percentage of these cases of miliary tuberculosis are being diagnosed. We shall always have a large personal factor to contend with in interpreting fine miliary shadows or linear markings on the film, as pointed out by Doctor Carter. One man may refer to a slight accentuation of linear markings as stage one of silicosis, while the other man may refer to it as "the stage of imagination." When one attempts to compare a series of chest films made at different institutions with different voltages, and in various stages of respiration, and perhaps with a few portable films thrown in for good measure, one realizes that illusions may not be confined to the mentally deficient alone. When the history and clinical findings do not corroborate the x-ray findings, it is best to minimize the x-ray findings.

✽

MILTON J. GEYMAN, M.D. (Cottage Hospital, Santa Barbara).—Doctor Carter has so thoroughly covered the subject of miliary lesions that further discussion seems superfluous. However, I should like briefly to mention two less commonly seen miliary pulmonary diseases.

While in Stockholm last year, an assistant of Lysholm, at the Royal Seraphimer Hospital, showed me an interest-

ing group of cases of a condition which they called lympho-granuloma benignum, known here as Boeck's disease, or pulmonary sarcoid. The roentgen picture of these cases varies considerably as to the number, size, and distribution of the lesions. All of them show some degree of hilar adenopathy. The lesions in most cases show a tendency to disappear under treatment, their results being better with arsenic than with roentgen therapy.

Another lung involvement resembling miliary tuberculosis is seen in certain epidemics of measles. These lung changes disappear within eight or ten days. An embarrassing error may be avoided if this similarity is kept in mind.

I should like also to stress Doctor Carter's remarks as to technical considerations. The slightest deviation from accurate technique will preclude visualization of some miliary pulmonary diseases, and perfect films are a primary requisite in the study of obscure pulmonary conditions.

✽

M. L. PINDELL, M.D. (670 South Ferris Avenue, Los Angeles).—This is a very timely subject, and is discussed by Doctor Carter in his usual thorough manner. Miliary type of deposits in the lungs have caused me considerable trouble and embarrassment. Not long ago I was asked to render an opinion on a film taken of a ten-year-old girl in the hospital. It was the usual miliary seeding throughout both lung fields that we so commonly see in miliary tuberculosis. She was running a high temperature, and I told her uncle, a physician, that she undoubtedly had miliary tuberculosis and would probably die within a few days. In less than a week this little girl was perfectly well—and did my face get red. She apparently had a bronchopneumonia.

As Doctor Carter states, "the negative film does not exclude the disease." About two years ago a film was taken in our department of a seventeen-year-old female, and was reported as negative. In three weeks this patient died in the General Hospital of miliary tuberculosis. A film taken two days before death showed miliary dissemination with typical summation effect. Epithelioid tubercles may have been present when the first film was taken, as the patient was at that time quite ill.

I am glad Doctor Carter has stressed the technical difficulties involved. In addition to a regular postanterior view, an anteroposterior film is sometimes helpful. Doctor Carter's plea for exhaustive clinical aid should be heeded.

SUICIDE*

By F. G. LINDEMULDER, M.D.

AND

F. E. TOOMEY, M.D.
San Diego

SUICIDE has been both condoned and condemned since earliest times. Only since the birth of modern psychiatry have any comprehensive attempts at its prevention been made. Nevertheless, self-destruction is not decreasing. Because San Diego County has the unenviable reputation of having one of the highest suicide rates in the country, a statistical study of its 533 cases occurring in the seven-year period between 1931 and 1938 has been made in the hope that its findings might shed some light on the causes and possible prevention of suicide.

We feel that the number of unsuccessful attempts far exceeds the actual number of suicides, although there are no accurate figures on this point. Our cases include all of those in which suicide was the probable cause of death. All unsuccessful attempts and undoubtedly many cases of indirect

* Read before the Neuropsychiatry Section of the California Medical Association at the sixty-seventh annual session, Pasadena, May 9-12, 1938.

From the Rees-Stealy Clinic.